

## CLAIMS

I/we claim:

1. A wheel end assembly comprising:

a bearing shaft having an inboard end and an outboard end;

a wheel hub mounted onto said outboard end of said bearing shaft;

a detachable outboard joint mounted onto said inboard end of said bearing shaft; and

a wheel bearing mounted onto said bearing shaft between said inboard end and said outboard end;

said inboard end of said bearing shaft including a flange portion, said flange portion providing a support to keep said wheel bearing positioned onto said bearing shaft and to induce a pre-load into said wheel bearing such that said pre-load is maintained on said wheel bearing when said outboard joint is removed from said wheel end assembly.

2. The wheel end assembly of claim 1 wherein said wheel bearing comprises:

a knuckle flange adapted to connect said wheel end assembly to a vehicle, said knuckle flange having an inner diameter that defines an inboard outer race and an outboard outer race;

an inboard inner race and an outboard inner race supported on said bearing shaft; and

a plurality of bearing elements, a first portion of said bearing elements being positioned between said inboard outer race and said inboard inner race and a second portion of said bearing elements being positioned between said outboard outer race and said outboard inner race;

said flange portion of said bearing shaft engaging said inboard inner race to support said wheel bearing and to induce a pre-load into said wheel bearing.

3. The wheel end assembly of claim 2 wherein said outboard inner race is integrally formed within the bearing shaft.

4. The wheel end assembly of claim 2 wherein said wheel hub includes a brake rotor having a braking ring, said braking ring and said brake rotor being integrally formed with one another.

5. The wheel end assembly of claim 2 wherein said wheel hub and said bearing shaft are integrally formed with one another.

6. The wheel end assembly of claim 1 wherein said outboard joint includes a bell housing, said bell housing having a narrowed neck portion defining a bell housing inner surface, said bell housing inner surface having a polygon shape, said bearing shaft presenting an outer surface at said inboard end, said outer surface of said bearing shaft presenting a polygon shape corresponding to said polygon shaped bell housing inner surface such that said bell housing engages said bearing shaft and rotationally locks said bell housing and said bearing shaft to one another.

7. The wheel end assembly of claim 6 wherein said polygonal shaped bell housing inner surface and said polygonal shaped outer surface of said bearing shaft are tapered along a longitudinal axis of said wheel end assembly.

8. The wheel end assembly of claim 6 wherein said polygon shaped outer surface of said bearing shaft is formed within said flange portion of said bearing shaft.

9. The wheel end assembly of claim 8 wherein a notch extends circumferentially around a portion of said polygon shaped outer surface of said bearing shaft, and said bell housing includes at least one window formed within said narrowed neck, said wheel end assembly further including a retaining clip inserted through said at least one window and engaging said notch of said bearing shaft to secure said bell housing to said bearing shaft.

10. The wheel end assembly of claim 8 wherein a notch extends circumferentially around a portion of said polygon shaped outer surface of said bearing shaft, and a groove extends around said bell housing inner diameter, said wheel end assembly further including a retaining ring positioned within said groove within said bell housing, said retaining ring engaging said groove and said notch of said bearing shaft to secure said bell housing to said bearing shaft.

11. The wheel end assembly of claim 6 wherein said bearing shaft includes a ring mounted thereon, said ring positioned between said wheel bearing and said flange portion of said bearing shaft and presenting an outer surface, said polygon shaped outer surface of said bearing shaft being formed in said outer surface of said ring.

12. The wheel end assembly of claim 11 wherein a notch extends circumferentially around a portion of said polygon shaped outer surface of said ring, and said bell housing includes at least one window formed within said narrowed neck, said wheel end assembly further including a retaining clip inserted through said at least one window and engaging said notch of said ring to secure said bell housing to said bearing shaft.

13. The wheel end assembly of claim 11 wherein said ring includes a splined inner diameter and said bearing shaft includes a splined outer diameter, said spline of said ring engaging said spline of said bearing shaft such that said ring is rotationally locked onto said bearing shaft.

14. The wheel end assembly of claim 11 wherein said ring includes an inboard face having a plurality of axial extending ridges, said flange portion of said bearing shaft engaging said axially extending ridges such said ring is rotationally locked onto said bearing shaft.

15. The wheel end assembly of claim 11 wherein a notch extends circumferentially around a portion of said polygon shaped outer diameter of said ring, and a groove extends around said bell housing inner diameter, said wheel end assembly further including a retaining ring positioned within said groove within said bell housing, said retaining ring engaging said groove and said notch of said ring to secure said bell housing to said bearing shaft.

16. A wheel end assembly comprising:

a bearing shaft having an inboard end and an outboard end;

a wheel hub mounted onto said outboard end of said bearing shaft;

a wheel bearing mounted onto said bearing shaft between said inboard end and said outboard end, said inboard end of said bearing shaft including a flange portion, said flange portion providing a support to keep said wheel bearing positioned onto said bearing shaft and to induce a pre-load into said wheel bearing such that said pre-load is maintained on said wheel bearing when said outboard joint is removed from said wheel end assembly; and

a detachable outboard joint mounted onto said inboard end of said bearing shaft, said outboard joint including a bell housing, said bell housing having a narrowed neck portion defining a bell housing inner surface, said bell housing inner surface having a polygon shape and being axially tapered along a longitudinal axis of the wheel end assembly, said flange portion of said bearing shaft presenting an outer surface having a polygon shape and an axial taper corresponding to said polygon shaped bell housing inner surface such that said bell housing engages said flange portion of said bearing shaft and rotationally locks said bell housing and said bearing shaft to one another.

17. The wheel end assembly of claim 16 wherein said wheel bearing comprises:

a knuckle flange adapted to connect said wheel end assembly within a vehicle, said flange having an inner diameter that defines an inboard outer race and an outboard outer race;

an inboard inner race and an outboard inner race supported on said bearing shaft; and

a plurality of bearing elements, a first portion of said bearing elements being positioned between said inboard outer race and said inboard inner race and a second portion of said bearing elements being positioned between said outboard outer race and said outboard inner race;

said flange portion of said bearing shaft engaging said inboard inner race to support said wheel bearing and to induce a pre-load into said wheel bearing.

18. The wheel end assembly of claim 17 wherein said outboard inner race is defined by an outer surface of said bearing shaft.

19. The wheel end assembly of claim 17 wherein said wheel hub includes a brake rotor having a braking ring, said braking ring and said brake rotor being integrally formed with one another.

20. The wheel end assembly of claim 17 wherein said wheel hub and said bearing shaft are integrally formed with one another.

21. The wheel end assembly of claim 16 wherein a notch extends circumferentially around a portion of said polygon shaped outer surface of said flange portion of said bearing shaft, and said bell housing of said outboard joint includes at least one window formed within said narrowed neck, said wheel end assembly further including a retaining clip inserted through said at least one window and engaging said notch of said bearing shaft to secure said bell housing to said bearing shaft.

22. The wheel end assembly of claim 16 wherein a notch extends circumferentially around a portion of said polygon shaped outer surface of said flange portion of said bearing shaft, and a groove extends around said bell housing inner surface, said wheel end assembly further including a retaining ring positioned within said groove within said bell housing, said retaining ring engaging said groove and said notch of said flange portion of said bearing shaft to secure said bell housing to said bearing shaft.

23. A wheel end assembly comprising:

    a bearing shaft having an inboard end and an outboard end;

    a wheel hub mounted onto said outboard end of said bearing shaft;

    a wheel bearing mounted onto said bearing shaft between said inboard end and said outboard end, said inboard end of said bearing shaft including a flange portion, said flange portion providing a support to keep said wheel bearing positioned onto said bearing shaft and to induce a pre-load into said wheel bearing such that said pre-load is maintained on said wheel bearing when said outboard joint is removed from said wheel end assembly;

    a ring mounted onto said bearing shaft between said wheel bearing and said flange portion, said ring being rotationally locked to said bearing shaft; and

    a detachable outboard joint mounted onto said inboard end of said bearing shaft, said outboard joint including a bell housing, said bell housing having a narrowed neck portion defining a bell housing inner surface, said bell housing inner surface having a polygon shape and being axially tapered along a longitudinal axis of said wheel end assembly, said ring presenting an outer surface having a polygon shape and an axial taper corresponding to said polygon shaped bell housing inner surface such that said bell housing engages said ring and rotationally locks said bell housing and said ring to one another.

24. The wheel end assembly of claim 23 wherein said wheel bearing comprises:

a knuckle flange adapted to connect said wheel end assembly within a vehicle, said flange having an inner diameter that defines an inboard outer race and an outboard outer race;

an inboard inner race and an outboard inner race supported on said bearing shaft; and

a plurality of bearing elements, a first portion of said bearing elements being positioned between said inboard outer race and said inboard inner race and a second portion of said bearing elements being positioned between said outboard outer race and said outboard inner race;

said flange portion of said bearing shaft engaging said inboard inner race to support said wheel bearing and to induce a pre-load into said wheel bearing.

25. The wheel end assembly of claim 24 wherein said outboard inner race is defined by an outer surface of said bearing shaft.

26. The wheel end assembly of claim 24 wherein said wheel hub includes a brake rotor having a braking ring, said braking ring and said brake rotor being integrally formed with one another.

27. The wheel end assembly of claim 24 wherein said wheel hub and said bearing shaft are integrally formed with one another.

28. The wheel end assembly of claim 23 wherein a notch extends circumferentially around a portion of said polygon shaped outer surface of said ring, and said bell housing includes at least one window formed within said narrowed neck, said wheel end assembly further including a retaining clip inserted through said at least one window and engaging said notch of said ring to secure said bell housing to said bearing shaft.

29. The wheel end assembly of claim 23 wherein said ring includes a splined inner diameter and said bearing shaft includes a splined outer diameter, said spline of said ring engaging said spline of said bearing shaft such that said ring is rotationally locked onto said bearing shaft.

30. The wheel end assembly of claim 23 wherein said ring includes an inboard face having a plurality of axial extending ridges, said flange portion of said bearing shaft engaging said axially extending ridges such said ring is rotationally locked onto said bearing shaft.

31. The wheel end assembly of claim 23 wherein a notch extends circumferentially around a portion of said polygon shaped outer surface of said ring, and a groove extends around said bell housing inner surface, said wheel end assembly further including a retaining ring positioned within said groove within said bell housing, said retaining ring engaging said groove and said notch of said ring to secure said bell housing to said bearing shaft.